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A STUDY OF MEDIA PRODUCTION AND REPRODUCTION OPTIONS FOR THE F--ETC(U)
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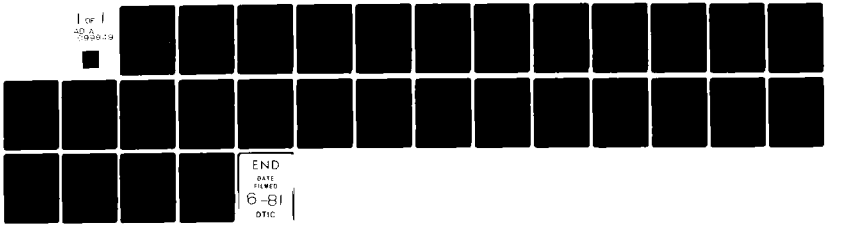

F-16 AIRCREW TRAINING DEVELOPMENT PROJECT

Contract No. F02604-79-C8875

A STUDY OF MEDIA PRODUCTION AND REPRODUCTION OPTIONS FOR THE F-16 PROJECT

DEVELOPMENT REPORT No. 16
MARCH 1981

Prepared in fulfillment of CDRL no. B022

by

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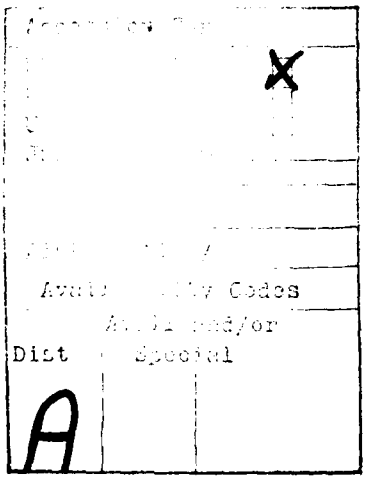
PREFACE

This report was created for the F-16 Aircrew Training Development Project contract no. F02604-79-C8875 for the Tactical Air Command to comply with the requirements of CDRL no. 8022. The project entailed the design and development of an instructional system for the F-16 RTU and instructor pilots. During the course of the project, a series of development reports was issued describing processes and products. A list of those reports follows this page. The user is referred to Report No. 34, A Users Guide to the F-16 Training Development Reports, for an overview and explanation of the series, and Report No. 35, F-16 Final Report, for an overview of the Instructional System Development Project.



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EXECUTIVE SUMMARY

The on-time production of instructional materials is a critical factor in the successful implementation of the F-16 training system. It is estimated that the total production requirements for the B, IP, and continuation courses will be 405 workbooks, 405 slidetape sets, and 90 videotapes. In addition, another 1,012 pages of printing will be required for handbooks, tests, and checklists. These estimates were based on the number of segments suggested by the task listing document and certain assumptions regarding the nature of the workbooks and tapes required.

The production and reproduction capabilities located at Hill AFB, Ogden, Utah were examined to determine if the production and reproduction needs of the F-16 project could be met there. Production refers to the development of original instructional materials (both prototype and final) and the preparation of reproductible masters. Reproduction is the duplication of camera-ready masters, slides, audio and videotape masters for distribution to users.

The Hill AFB printing, photo lab, and television center capabilities are seen as adequate to support the reproduction requirements of the F-16 project as presently estimated.

In the area of production, it appears that the printing shop does not have the capacity to handle the volume of F-16 requirements for pint layout and design. However, printing can provide enlargement/reduction capability for the proportion of photostatic copies to be used in workbook paste-up in addition to a moderate amount of printing samples and proof copies. A working relationship with Detachment 8, which operates the Ogden Air Logistics Center Television Center, is recommended, provided that some adjustment of priorities is made and if adequate provision can be made for technical and instructional direction by the contractor. The graphics unit, as presently staffed, could support the F-16 project in the production of graphics. Certain constraints and considerations in the production of F-16 photography make it imperative that photographers be contractor supplied although it would be advantageous to establish a working agreement with the Hill AFB photo lab for additional support in surge/crisis situations.

Major concerns in the establishment of this interface between government-supplied and contractor-supplied agencies and personnel are accountability, communication, and control. The

contractor is accountable for instructional and technical quality and the cost and timelines of the product. Problems can result in the communication of necessary directions and specifications between producing agencies. The concern over control deals with the loss of control on the part of the contractor over those who are producing a contract deliverable for which the contractor is responsible.

CONTENTS

LIST OF FIGURES AND TABLES

A STUDY OF MEDIA PRODUCTION AND REPRODUCTION OPTIONS FOR THE F-16 PROJECT

1.0 INTRODUCTION

This report is in response to contract requirement CDRL B022 to provide documented recommendations and rationale for reproduction of forms, documents and courseware for the F-16 instructional system. Existing contractual agreements specify that production of a reproducible master copy of deliverable instructional materials will be done by the contractor.

Throughout this report the terms "production" and "reproduction" will be used. By production is meant the production of original instructional materials (both prototype and final) and the preparation of reproducible masters including:

1. Camera-ready masters of two dimensional instructional materials--pictorial and written
2. Still photographic materials--prints and slides
3. Audiotape masters
4. Videotape masters

This includes the activities, supplies, equipment, sites and facilities involved in such production.

Reproduction is defined as the duplication of camera-ready masters, slides, audio and videotape masters for distribution to multiple users.

During Phases V and VI of the F-16 Aircrew Training Development Project, the analysis and design phases, Phases III and IV, will culminate in the production and reproduction of large quantities of instructional materials and tests. In the period of time from October 1, 1978 to September 1980, large quantities of media production will be required. Capabilities will be required in the areas of pasteup and printing of workbooks, photographing and developing of slides for tape/slide presentations, recording and editing of audiotapes, and recording and editing of videotapes. Production loads larger than normal will be placed on media production facilities. In addition, reproduction of each of the

above classes of material will be required in sufficient quantities to make multiple copies available at all F-16 training sites.

Both production and reproduction tasks must be carefully scheduled so that the instructional elements and management mechanisms of the F-16 instructional system may be brought together at the designated times for implementation. On-time production and reproduction of materials is a critical factor in the F-16 project time line. Agencies will be needed which can process the high volume of work without experiencing backups in the flow of production.

This report: (1) Projects the required volume of reproduction for the F-16 Project (Section 3.0), (2) presents a summary of the reproduction capabilities located at Hill AFB, Ogden, Utah (Section 4.0),and (3) makes recommendations concerning use of these facilities for reproduction (Section 4.0). Secondarily, the possible advantages of involving Hill AFB-located facilities during initial production of the reproducible masters will be considered (Section 5.0). Recommendation will be made concerning the potential benefit of such participation and problems associated.

2.0 PRODUCTION AND REPRODUCTION PERIODS

Production will take place during two main periods. In the first period, B and instructor pilot (IP) course materials will be produced beginning on October 1, 1978. Reproduction of materials from reproducible masters is expected to start during January 1979 and to continue until November 1979.

The second period will produce the continuation training materials with final version production beginning approximately January 1980 and ending November 1980. The production demands during this period will be less than during the first production period. Reproduction of materials during this period begin in January 1980 and continue through November 1980.

Additional production needs will be present following the second production period. These needs are difficult to estimate at this time. They consist of production and reproduction of revised materials from all courses following implementation of the instructional system, and the ongoing reproduction of additional copies of already-existing materials to meet student throughput requirements, even after termination of the contract in February 1982.

3.0 PROJECTED PRODUCTION AND REPRODUCTION NEEDS

The original media mix projections prior to May 1977 contained the item totals presented in Table 1.

These totals included the projected media mix for the B, IP, and continuation training courses. Media for the conversion or C course, a course intended to train F-16 pilots already trained in other fighter aircraft, was not included in the original media projection, since the media for that course will be a subset of the media for the B course. Projections also divide the main production period into parts, reflecting the level of effort required during each year.

During September 1977 updated projections based on existing pilot task listings were made as shown in Table 2. The net change in projections indicate (1) the present intention to eliminate the random access slide projector as an instructional medium, (2) a slight decrease in the number of B course segments, (3) a sizeable increase in the number of IP course segments, (4) a sizeable increase in the number of continuation course segments, and (5) a redistribution of segments across media types.

These estimates represent the best information available. Exact figures are likely to vary as the project progresses. Media selections have not been made, which means that new media may be added to or dropped from the projections list.

Certain assumptions were used to obtain the projections:

1. The number of segments is estimated based on the size of the current version of the task listing document.

2. It is presently assumed that workbook, tape/slide, and videotape will be the main media choices. Other devices will be added if and when a need for them is demonstrated during media selection.

3. The IP course and the B course are of approximately the same size. In the light of a changing perception of IP training needs, this seems to be a stable assumption. However, estimates for the IP course are not as firm as those for the B and continuation course because the IP task listing has not been made at this stage of the project.

4. The continuation training materials will represent about 20 percent of the total. This is likely to range upward as perceptions of continuation training change and constraints and limitation factors concerning availability of aircraft sorties for training become known.

The production volume totals for each medium shown in Table 3 were made based on the Table 2 figures.

TABLE 1

Original media mix projections
(Prior to May 1977)

Type of Media Presentation to be Produced	Predicted Number of Instructional Segments to be Produced			
	1st Production Period (1979-1980)		2nd Production Period (1980-1981)	
	B course	IP Course	Continuation	Totals
Workbooks	290	29	10	329
Slide/tape sets	105	11	10	126
Videotape recordings	17	2	2	21
Random access sets	17	2	0	19
Total Segments*	429	44	22	495
Additional Printing Req. (pages)				
Performance checks		170	42	212
Student handbooks		160	40	200
Instructor handbooks		160	40	200
Checklists		320	80	400
Total		810	202	1012

*one segment = one objective

TABLE 2

Updated Media Mix Projections
(as of September, 1977)

Type of Media Presentation to be Produced	Predicted Number of Instructional Segments to be Produced			
	1st Production Period (1979-1980)		2nd Production Period (1980-1981)	
	B Course	IP Course	Continuation	Totals
Workbooks	162	162	81	405
Slide/tape sets	162	162	81	405
Videotape recordings	36	36	18	90
Random access sets	0	0	0	0
Total Segments*	360	360	180	900
Additional Printing Req. (pages)				
Performance checks	170		42	212
Student handbooks	160		40	200
Instructor handbooks	160		40	200
Checklists	320		80	400
Total	810		202	1012

*one segment = one objective

TABLE 3

Projected Production Volume Totals

	First Production Period	Second Production Period	Total
PRINT			
Workbooks to be printed (self-contained)	324	81	
Average number of pages per workbook	10	10	
Total Pages	3,240	810	4,050
Workbooks to accompany slide segments	324	81	
Average number of pages per workbook	4	4	
Total Pages	1,296	324	1,620
Worksheets to accompany video-tape recording	72	18	
Average pages per worksheet	4	4	
Total Pages	288	72	360
TOTALS	4,824	1,206	6,030
TAPE/SLIDE			
Average length of presentations	15 minutes	15 minutes	
Number of seconds on each slide	15 seconds	15 seconds	
Number of tape/slide segments	324	81	
Total original slides	19,440	4,860	24,300
Additional copies required for implementation	3	3	
Total duplicate slides	58,320	14,580	72,900
AUDIO RECORDING			
Average length of presentations	15 minutes	15 minutes	
Number of presentations	324	81	
Total minutes of audio recording	4860 minutes	1215 minutes	6,075
VTR			
Average length of video tapes	20 minutes	20 minutes	
Number of videotape segments	72	18	
Total minutes of videotape	1,440	360	1,800

4.0 REPRODUCTION FACILITY CAPABILITIES

To assess the existing capability for providing support to the F-16 reproduction effort, a study of the Hill AFB facilities was conducted. This section contains listings of facilities, equipment, and personnel available which might support F-16 in the areas of print, slide, audiotape, and videotape reproduction.

4.1 Printing

The printing facility at Hill AFB can print a 1,000 page document with high qualilty during one normal 8-hour workday. Periods of overtime to 16 hours can be authorized. The facility's printing equipment is of a variety sufficient to allow several approaches to obtaining usable copies. A Xerox 9200 copier, several photo offset printers, or a large printer capable of printing four pages at a time may be used.

Foldout charts up to 26" long can be produced in house by photo offset. Foldouts of unlimited length can be reproduced by the blueprint method, as long as the width does not exceed 48 inches. A contract exists to handle commercial printing of larger foldouts. The facility has no apparent limit on access to paper stocks.

Drilling, collation, and binding of printed materials is mechanized and sufficient to meet printing volume. Binding by staples is possible in either side stitch or saddle stitch formats. Comb binding is not allowed under new printing regulations. The print shop commonly handles pages ready for print.

Finally, should that capability be relevant to F-16 reproduction, the print shop can produce microfiche masters and duplicates.

4.2 Printing Summary

If camera-ready masters are supplied to the printing facility, it appears to be able to support the printing requirements as presently estimated. F-16 printing would need to have sufficient priority to obtain short turn-around times (2 to 3 days for a 10 page workbook) and to keep the flow of output constant. This might require that some lower priority print jobs be diverted to other local government print facilities in the Salt Lake City area.

4.3 Photo Lab

The photo facilities at Hill AFB consist of a film developing and duplication center with a civilian director and civilian staff of 13. Equipment seen was in serviceable condition with space availability being a problem in the main working area, primarily

due to the location of film library storage racks in this area. As a result of the lack of adequate space, processing, sorting, and packaging large amounts of slide material would likely create a problem. Relocating the film library from the photo lab would alleviate this problem. Seven separate darkrooms for film developing are located surrounding the main lab area. Two of these are set up for black and white printing and production and five for color printing and processing. The color printing technician runs the color printmaker. All workers are photo-lab specialists.

The lab director reports an ability to develop (using the E-4 process) and mount 25,000 slides per month. This is scheduled on an eight hour workday with two civilian slide specialists working in the lab.

The lab produces prints and enlargements of up to 20 X 24 inches.

The director indicates a working exchange arrangement with other members of the Army/Navy/USAF for processing of their overloads. This arrangement might have to be set aside to accommodate F-16 workloads.

The average production for the Hill AFB photo lab is approximately 10,000 color or black-and-white prints per month. With additional staffing, up to 40,000 prints per month might be produced. The lab is able to handle a large (but unspecified) number of rolls for developing.

It was reported by the previous lab supervisor that the portion of the duplication capability allocatable to F-16 purposes during production periods is 8 percent to 10 percent of the eight hour workday. This was given as the present availability limit which would lead to interference with other customers unless additional UDL positions were authorized.

The photo lab has adequate equipment in its inventory to support its developing and duplication needs. For color film processing, 16-35 mm, the lab has an ME-4 capable of producing 40 ft/min, a modified ME-4 with an output of 40-75 ft/min, two Kodak Model 11 Versomats, and one Versomat color slide film processor; for black and white processing, 16-70 mm, the lab has a Pako film processor. Two Bell & Howell motion picture printers handle 16 and 35 mm film. For processing color prints, the photo lab has a simplex color print processor, an Eastman 85 automatic color printer and two Omega color enlargers with dichroic heads. Two copy cameras complete the list of major equipment items: a 35 mm Sickles Circle 5 for duplicating color slides and copying flat copy work, and a 35 mm Repronar for duplicating color slides only.

Due to newly-changed supervision of the photo lab, up to date figures on plant capacity, availability, lead times required, costs, turnaround time, and priorities are subject to review. The description above of reproduction capabilities was obtained from

the previous lab supervisor. Confirmation of these figures was not given, but they are presented here as the best rough estimate of lab capacity. No samples of lab work quality, or consistency of quality under sustained output conditions have been viewed, so it is not possible to judge lab capability in that respect.

4.4 Photo Lab Reproduction Summary

Notwithstanding the lack of up to date information, the F-16 requirement seems to be well within the rough estimate of photo lab capabilities. Duplication is a comparatively simple process and the contractor has little doubt that the lab would be able to meet quantity demands. Quality of reproduced slides may pose a problem, however. Contractor supplied slide masters will be produced by the E-6 process. The Photo Lab currently uses E-4 processing, which yields a noticeably lower color quality. The lab director indicated that they would be upgrading to E-6 in a year to a year and a half. All this entails is obtaining a finer temperature controlled vat for the emulsion and a different set of chemicals. The E-6 process does not require any additional processing equipment. If the photo lab can upgrade to E-6 processing before January 1979, we see no reason to use any other USAF facility for F-16 slide reproduction needs. It is also assumed that sufficient priority can be given to F-16 work to assure a turnaround time short enough to meet the F-16 training schedule.

4.5 Television Center

Detachment 8 Television Center production capabilities at Hill AFB are described fully in Section 5.5. In terms of reproduction capabilities videotape duplication can be provided on two-inch quadraplex format and the Sony U-Matic 3/4 inch format. Sixteen mm film can be transferred to videotape within hours. Slide to tape transfers can also be done locally. If necesary, 16 mm kinescopes of videotapes can be obtained making use of facilities at Norton AFB. The normal turnaround time for for tape-to-film transfers is 6 weeks.

Facilities also include 1/4" and cassette tape recorders and decks and two 2000 series audio cartridge Spotmasters. The studio has no highspeed (single master-multiple slave) audiocassette duplication units.

4.6 Television Center Duplication Summary

Both videotapes and audiotape masters for tape/slides can be easily and quickly duplicated at the Detachment 8 Television Center in sufficient quantity to meet F-16's needs. If the number of copies of audiotapes needed increases over that estimated, however, it is recommended that a facility be utilized which has high-speed audiocassette duplication capabilities.

5.0 PRODUCTION FACILITY CAPABILITIES

While investigating the reproduction capabilities of Hill AFB located facilities, consideration was given to the possibility of utilizing selected audiovisual facilities during the initial production of reproducible masters. This section contains listings of facilities, equipment, and personnel available to augment contractor F-16 production efforts.

5.1 Facility Location Constraints

The location of production facilities used for instructional development support is critical. A facility arrangement which requires instructional materials to travel long distances between production steps is unsatisfactory. Figures 1 through 4 contain general flow diagrams for the production of instructional materials. At each step, as the evolving product is passed from one worker to another, detailed guidance and communication is required to maintain technical correctness, style, and instructional intent. The problems of this type of communication across large distances during a process as highly interactive as materials production are prohibitive. For this reason, this study will dwell exclusively on data gathered at Hill AFB, the site where authoring of instructional materials will take place, where the instructional system will first be implemented, and the site which has been proposed for production of the materials.

5.2 Printing Production Capabilities

Capabilities for preprinting preparation include an enlargement/reduction camera and a small composing and page layout area. The majority of the department's work involves reproducing camera-ready masters, although some paste-up work is done. Copy composing is done on the facility's hot-lead composer and on a varitype machine.

5.3 Photo Lab Production Capabilities

The photo lab contains a portrait studio with adequate backdrops, lighting, and camera equipment for flexible studio set-ups. The studio camera inventory includes 2 hand-held 35 mm cameras, another two 35 mm cameras on stands and eight 2 1/4 X 2 3/4 cameras. Five full time photographers are available about 90% of the work day. Although the facility has one movie camera, motion picture filming is restricted by AVVS.

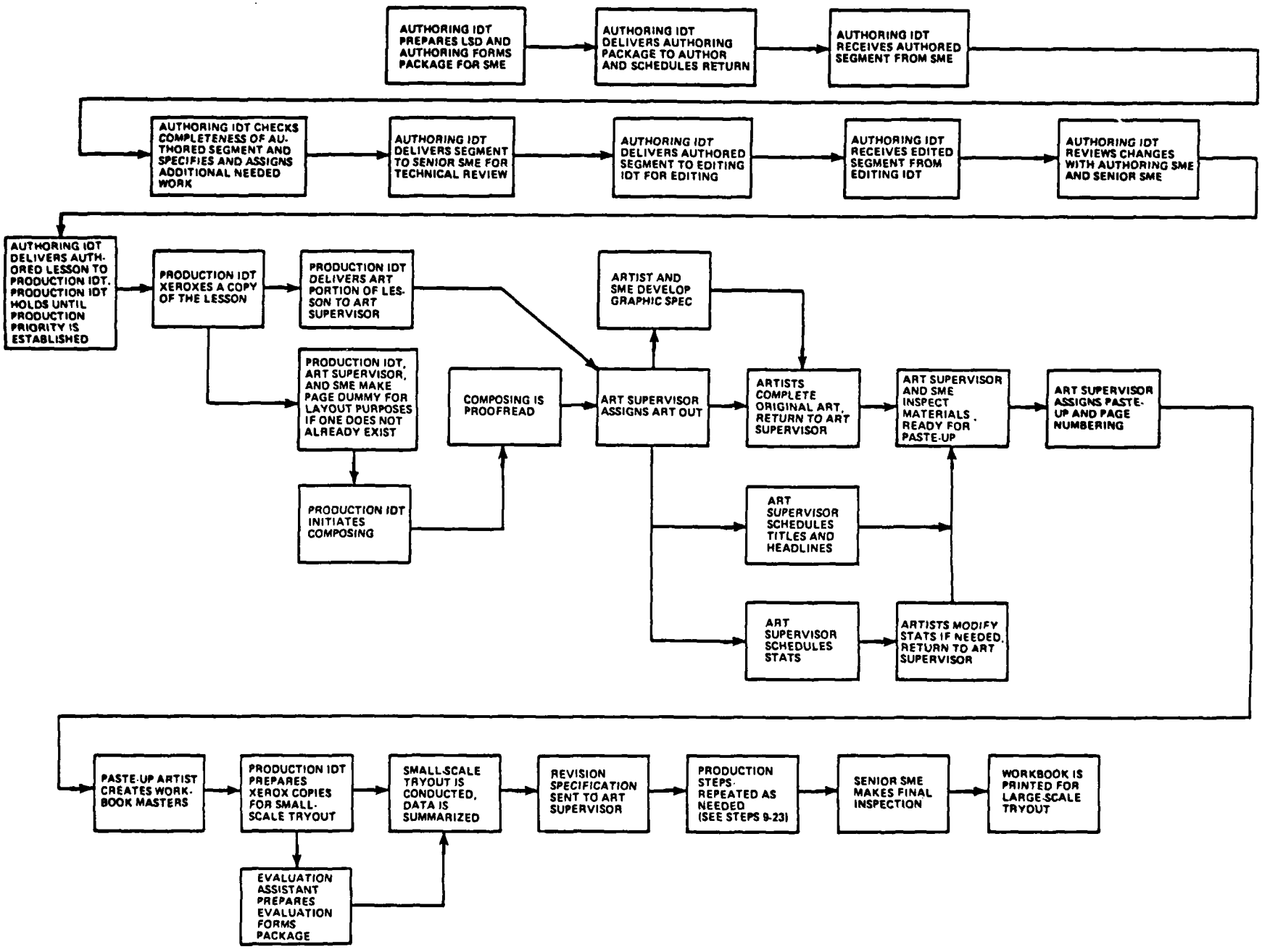

FIGURE 1 WORKBOOK AUTHORING AND PRODUCTION PROCESS

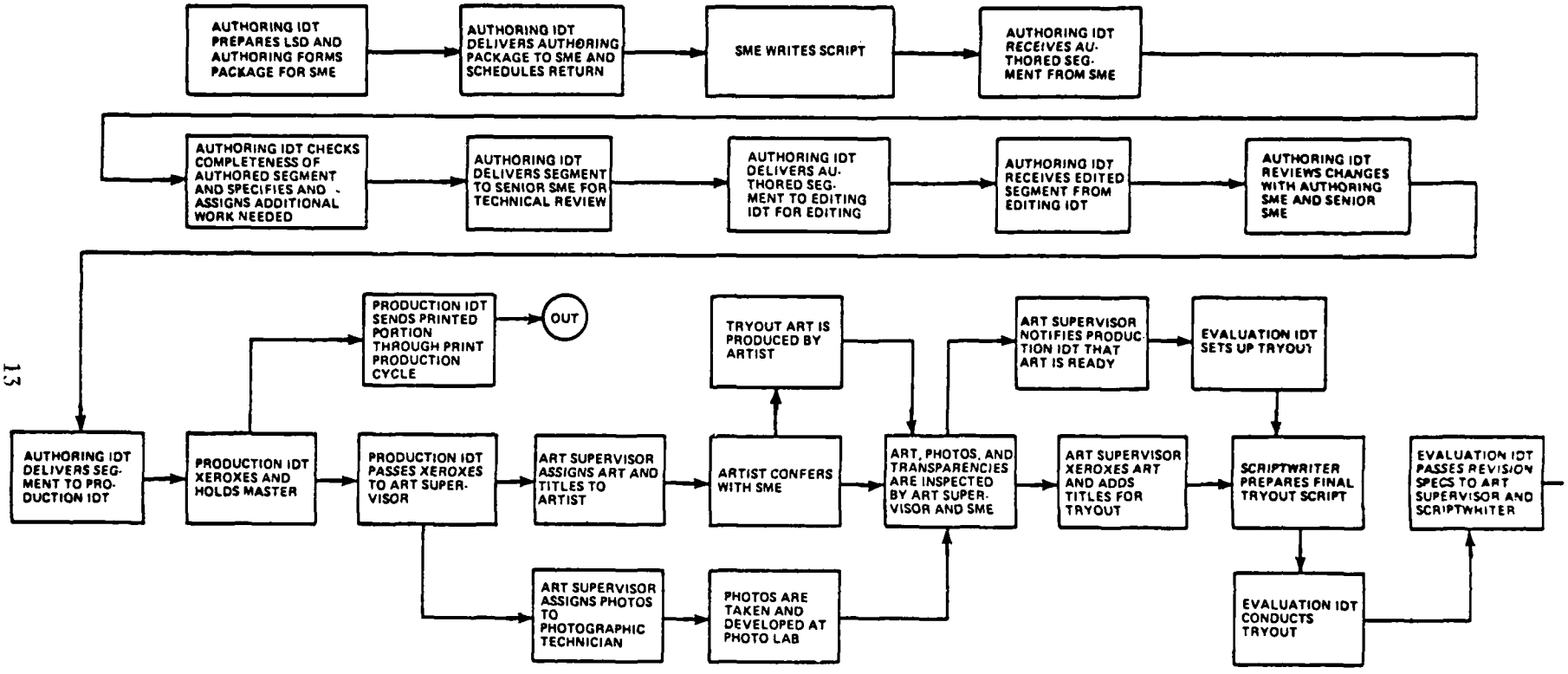

FIGURE 2 TAPE/SLIDE AUTHORING AND PRODUCTION PROCESS

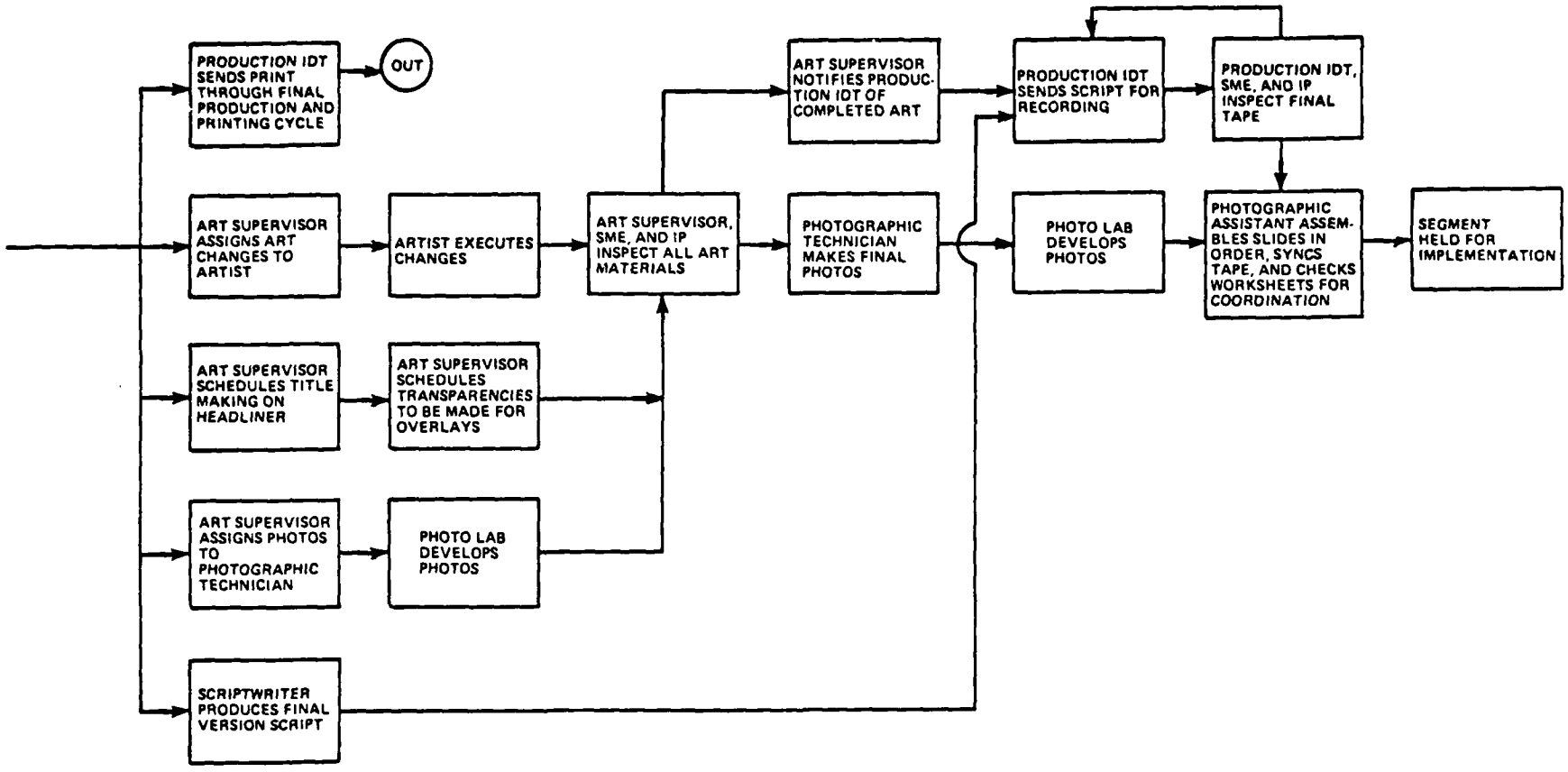

FIGURE 3 TAPE/SLIDE AUTHORING AND PRODUCTION PROCESS (CONT.)

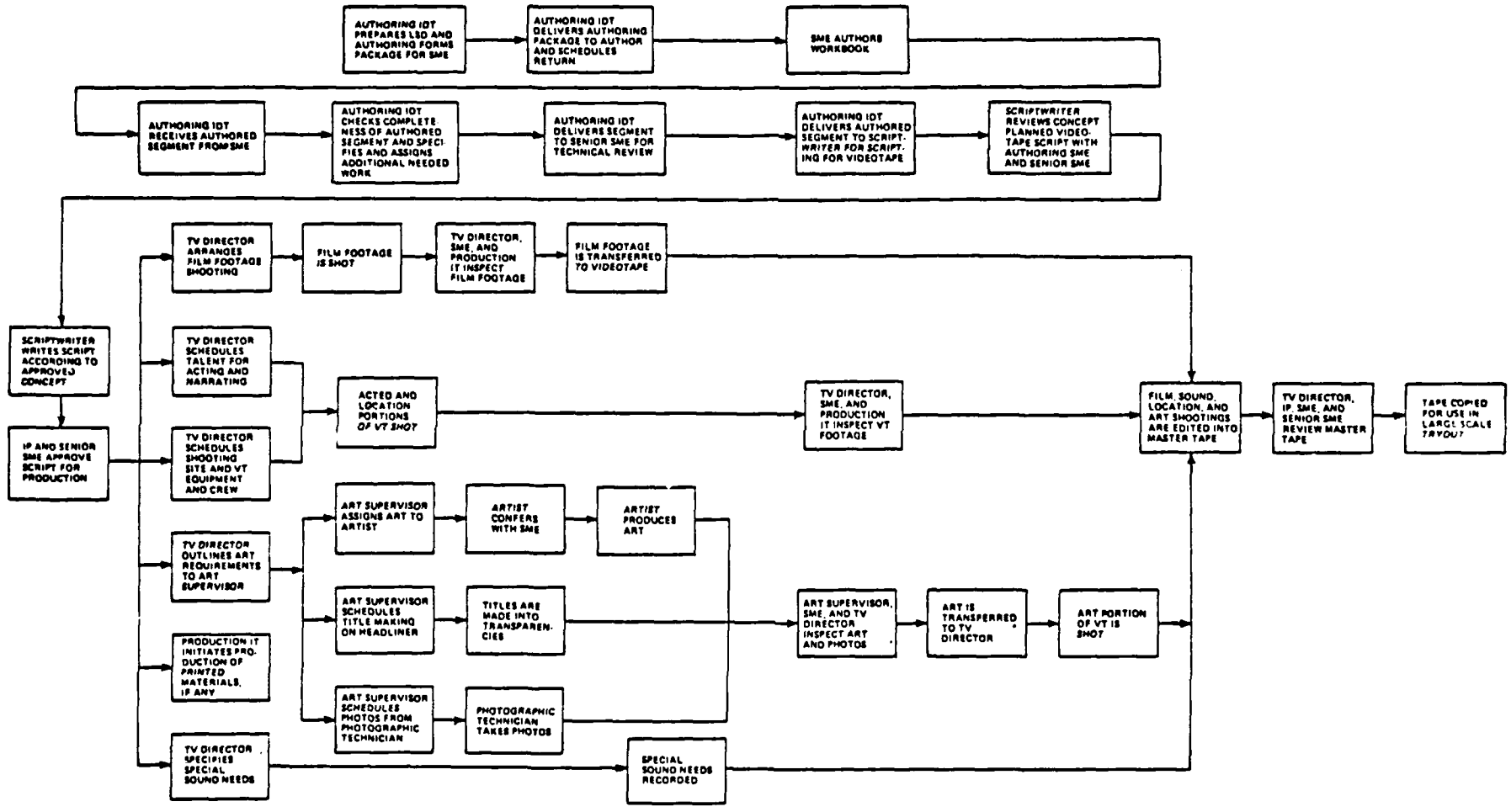

FIGURE 4 VIDEOTAPE AUTHORING AND PRODUCTION PROCESS

5.4 Graphics Production Capabilities

The Graphics Department described is separate from the graphics unit supporting the television center. It has an overlay production capability of approximately one VU graph with two or three overlays in a few minutes to six hours time, depending upon the complexity of the graphics. In addition to transparencies, Graphics can produce posters, fold-out charts up to 30 X 40 inches, drawings, exploded views, titles, etc. Production capability for photographable slide art exists, but no data are available on the rate at which it can be produced.

The graphics shop has three headliners with a complete set of 120 type fonts. F-16 presently is alloted a work time of one artist for approximately three hours per day. Highest priority is given F-16 work.

There are presently six artists in the department. It was reported that, it be desired, one artist could be designated to work full time daily on F-16 materials.

The unit now is 10 days behind schedule in support of the 388th TFW and other base activities. Most high priority work, including F-16, is completed on schedule.

In addition to complete inventory of the usual graphics arts supplies, the Graphics facility has three headliners and a complete set of type fonts, one Ozalid for color transparencies, and one Ttek copy camera on order.

5.5 Television Production Capabilities

The Ogden Air Logistics Center (ALC) Television Center is operated by Detachment 8, a subordinate unit of the 1365th Audio-visual Squadron, Kelly AFB, Texas. The facility is one of the best developed and equipped color television production facilities in the Department of Defense. The system operates on state-of-the-art broadcast industry color television standards. Facilities include full color studio production, remote color production, remote television backpack recording and aerial motion picture film documentation capabilities.

At present the facility is tasked to produce instructional videotapes in support of the Air Force Logistics Command, Ogden Air Logistics Center, logistics and depot maintenance training program and to support aircrew training and all Hill AFB tenants.

Authorized manning of the television center is as follows:

4	officer
7	civilians
20	enlisted personnel
31	Total

The unit is commanded by a Captain with an extensive background in audiovisual facility management. The seven civilians assigned include two GS-12, three GS-11, a GS-9 and GS-5 clerk/steno. The television center staff currently works an eight hour day. Personnel working more than 40 hours per week receive compensatory time off rather than overtime.

Eight authorized positions for TV production specialists or technicians are currently manned 85%. Two new producer-directors have recently joined the center's staff and are expected to be fully trained within six months. Half of the production specialists are voice qualified, although this situation could change.

The producer-directors have limited script-writing experience, although they are often involved in script rewrites and adaptation. It is the responsibility of the user to provide subject matter-knowledgable technical advisors to handle the program content. These advisors ideally become an active part of the production team. The user must also provide complete script outlines. This is standard practice.

Technical facilities of the television center are the finest in the Air Force and include RCA TK-44 studio color television cameras, an RCA TK-27 color television film camera, 15 monitor control board, Richmond-Hill Labs switcher and special effects generator, and a Chyron III B electronic character generation system. Master videotape recorders operate on quadraplex high-band standards.

SMPTE time code editing is accomplished using the Ampex RA-4000 and two Ampex AVR-2 quadraplex video recorders. This state of the art digital base editing system is one of two owned by the United States Air Force and is the same system used by local commercial TV station KSL in Salt Lake City.

There is a video cassette and audio editing studio separate from Master Control which has been utilized for mastering of the audio portion of tape/slides. In this studio are two AG-440 1/4 inch editing Ampex audio tape decks. There is also one RCA BC-15 console for mixing audio sources and two 2000 series audio cartridge Spotmasters. Audio mastering is done on 1/4 inch tape in the field to provide highest possible quality and then tranferred to cassettes. A Sony cassette recorder is also available for field recording. The audio track for studio productions is recorded directly on 2 inch videotape.

The television center has a complete, fully available music library (Media Music). No royalties need be paid unless videotapes are broadcast commercially. Voice qualified production specialists can do six to ten voice overs per week.

The center's full color mobile unit is self-contained and uses the RCA TKP-45 battery powered portable camera which employs an Ampex VR-3000 quad format video recorder or the Sony U-Matic 3/4

inch recorder (either the VO-2850 or VO-3800). The total investment in technical facilities alone exceeds $1,000,000.

A graphics center dedicated to support TV production is located 100 yards from the center. In addition to the production of opaque graphics it has limited animation capabilities. A narration booth and screening room complete the center's facilities.

A portion of a locally produced instructional videotape was viewed, showing good overall production quality in terms of studio production, graphics and editing. A videotape from a similar facility at Carswell AFB demonstrated the technical potential of the Detachment-8 system, especially in the area of special effects.

In fiscal year 1977, Detachment 8 produced 12,000 minutes of videotapes. The majority of this production was composed of unscripted, ad-lib briefings and self-critique. Four thousand three hundred and four minutes were instructional programs. Of these, 579 minutes were essentially televised lectures ("talking head"). The remaining 3,725 minutes were fully scripted studio productions which involved graphics and extensive editing. The average production length is approximately 20 minutes.

Responsiveness and production lead time depend upon customer requirements, priorities and the availability of technical support from the requesting activity. The work is controlled and priorities are established by the base/AFLC closed circuit television OPR (Office of Primary Responsibility) which is the 2849th Airbase Group Operations and Training Division.

Production flow time averages two to six weeks. Annual budget and operating funds are provided by the Military Airlift Command, Aerospace Audiovisual Service. Production costs averaged less than $100 per completed minute of production in fiscal year 1977. Hill AFB TV Center has the highest production output and the lowest operating costs of any Department of Defense operated closed-circuit television production facility.

Currently, the Detachment 8 teleproduction facility is not workloaded to its fullest potential. Editing appears to be the only area that is fully scheduled. Unless additional videotape editing and post production capabilities were acquired and put into operation, significant adjustments of the existing unit workload and priorities would be required to affectively sustain the projected F-16 production requirement. Specifically, the addition of a third Ampex VTR-2 quadraplex videotape recorder and another switcher would speed up the editing process by allowing A and B roll editing.

5.6 Production Summary

Of all the facilities investigated, the Detachment 8 Television capability is the most impressive. The TV Center is better

equipped than any the contractor could provide, and it would be a cost savings to the USAF to use this facility. However, Detachment 8 might not be able to handle the requirements for F-16 within the present tasking agreement. If priorities were adjusted by HQ MAC/ AFLC - TAC and some current production diverted to the two other TV facilities operated by AFLC, then Detachment 8 could fully and adequately accommodate projected requirements for F-16 videotape production. If so, and if adequate provision can be made for technical and instructional direction by the contractor, as well as contractor-supplied narration, a working relationship with the facility would be highly recommended.

The printing shop does not appear to have sufficient capacity to handle the high volume of F-16 requirements for print layout and design. The composing and paste up area is small and could not support the number of contractor supplied paste-up artists needed to complete the workbooks in the volume required. However, printing can provide enlargement/reduction capability for the preparation of photostatic copies to be used in workbook paste-up as well as a moderate amount of printing for the preparation of samples and proof copies.

As presently staffed the graphics unit could support the effort in the production of graphics. Particularly the F-16 OTD team has identified a large need for graphics support for TAC/HQ USAF/EPG high-level briefings and the initial F-16 training course. It is recommended that the one graphic artist allocatable to F-16 be assigned full time to this effort.

Difficult technical directions required for F-16 photography, the variety of settings and subjects, the importance of high lighting and composing photographs in particular instructionally impacting ways, and the difficulty of providing direction to photographers across agency boundaries, make it imperative that photographers be contractor supplied. It would however, be advantageous to establish a working agreement with the photo lab for photographer support to the contractor in a surge/crisis situation. Base photo studio personnel could also support the needs of the OTD Team.

5.7 Conclusions

Although to a certain extent the media production procedures carried out by F-16 may be shared between contractor and government-supplied production resources, it is felt that there are limitations upon the extent of the interaction by virtue of the complex and highly interactive nature of production processes.

Major concerns on the part of the contractor in effecting this interface between government-supplied and contractor-supplied agencies and personnel are accountability, communication and control.

In the production of instructional materials, there must be accountability for instructional quality and accountability for technical quality. In addition, there must be accountability for the cost and timeliness of the product. Standards of accountability are inherent in the contract for the F-16 instructional development. To the extent that the contractor turns over portions of the instructional development process to other agencies, it is unable to answer for the instructional and technical quality, the cost, and the timeliness of those portions of work, though a responsibility to be accountable for them would still exist in the contract. Moreover, in such a working relationship it becomes extremely difficult to affix responsibility for the timely production of intermediate products.

Also an important problem in interfacing production agencies is the difficulty in communicating the necessary directions and specifications between producing agencies. There is a necessary increase in time and expense resulting from the formalized communications required to carry out extensive coordination between production agencies. Even if all necessary technical communications could be completely formalized, which is not certain, carrying out the directions they contain is costly in time and effort, and very often communication is incomplete, causing revisions and duplication of efforts. Also, the lag time required for making adjustments in communications due to last minute changes is an added problem.

The final issue in production agency interface is the loss of control on the part of the contractor over those who are doing work on a contract deliverable for which the contractor is responsible. In the relationship between government agencies and a contractor supplied agency, too much reliance on non-contractor personnel would render the contractor less able to direct the work of project personnel, to affect adequate quality control over products and processes, to control work and vacation schedules, to select work personnel and styles, and to fill vacancies. It would also decrease the capability of the contractor to respond to temporary increases or surges in work requirements.

It is felt that the augmentations recommended above in this report (Section 5.6) represent a mixture of contractor and government supplied efforts which avoids these problems while at the same time maximizing the use of existing resources, without disturbing too greatly the accomplishment of other ongoing work requirements. The arrangements recommended allow the contractor maximum accountability for both technical and instructional qualities of materials created and make the contractor better capable of responding to cost and timeliness requirements. It is felt that with the recommended mixture of contractor and government supplied efforts, the production of F-16 materials can be carried out in a timely, efficient, cost-effective manner, producing instructional materials of high technical and instructional quality.

5.8 Summary of Recommendations

Provided the requirements for changes in priorities and other reservations stated above are met, the following recommendations are made for use of Hill AFB facilties:

REPRODUCTION

1. Base Reproduction (Printing) should reproduce all camera ready masters.

2. Photo Lab should duplicate all slides.

3. Television Center should duplicate videotape and audio tape masters.

PRODUCTION

1. Printing should provide enlargement/reduction capability for the preparation of photostatic copies to be used in workbook paste-up as well as a moderate amount of printing samples and proof copies.

2. Graphics should provide one artist full-time to support initial course development and OTD team command and visitor briefings.

3. Photo Lab should provide one photographer to support initial course and OTD team briefings.

4. TV Studio should provide full TV production facilities to F-16, including production and engineering crews, TV graphics and editing.


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